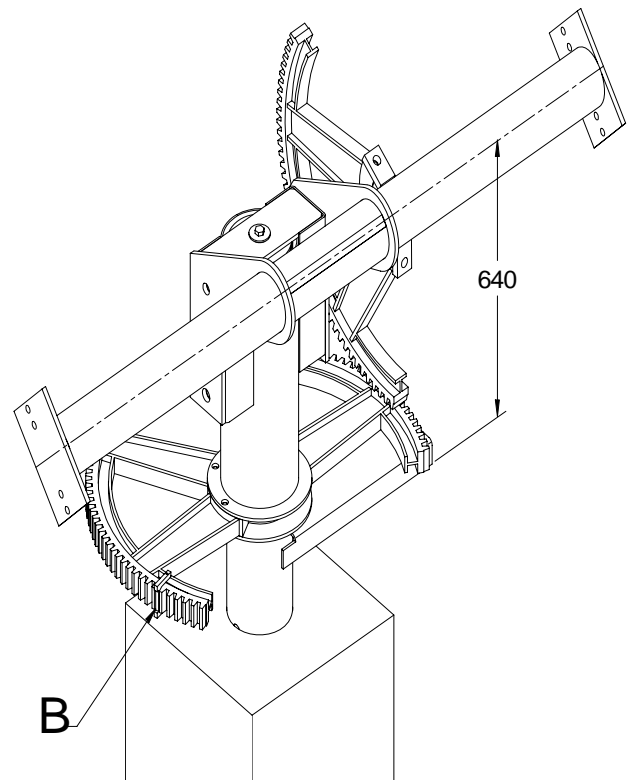
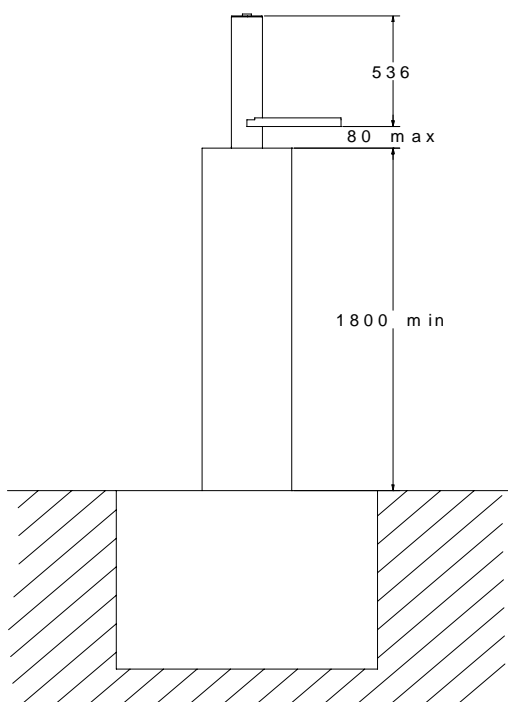
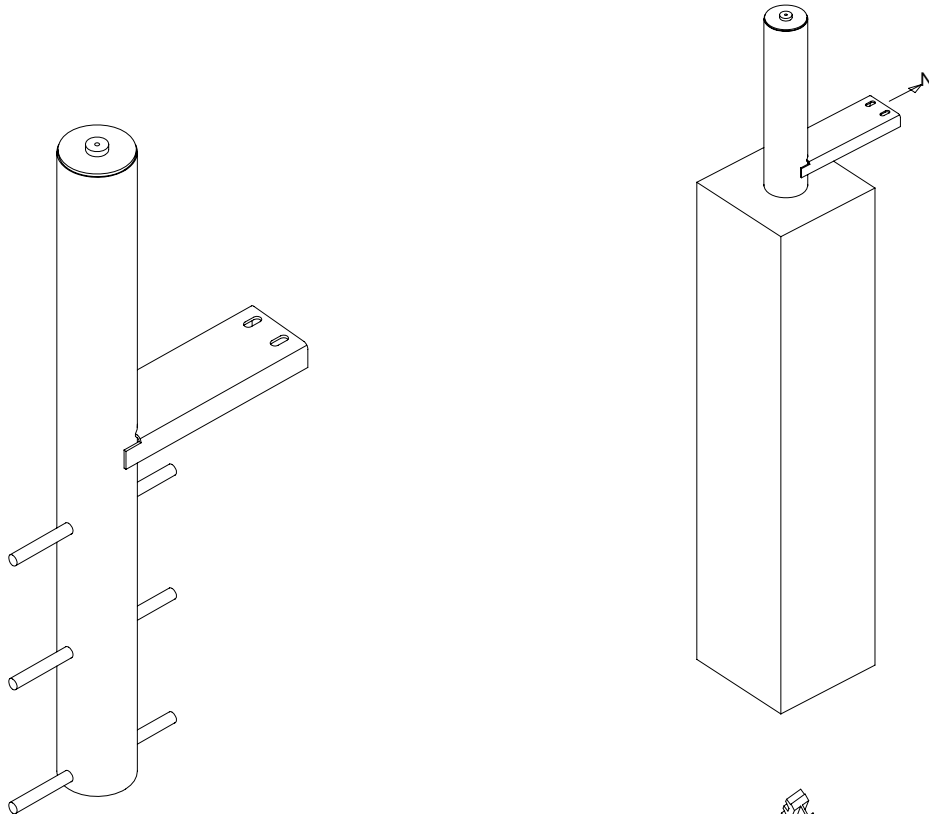


SOLAR TRACKER FEATURES SF20



- Mast that is inserted in the cement. (Galvanised and coated with zinc)
- Moving tube that rotates around the mast (Galvanised and coated with zinc)
- Sprocket Module 6, Diameter 720mm, clockwise movement (melted aluminium).
- Sprocket Module 6, Diameter 720mm, inclination movement (melted aluminium, tempered).
- Axle, diameter 100 mm, L=1,500 mm, structure inclination. (Galvanised and coated with zinc).
- Two motor sets with their gears, their headless nuts and turn counter switch and protection box (Galvanised and coated with zinc). -Two crosswise bars of 5 metres for supporting the transversal bars (Galvanised)
- An electronic box with the connections for the motors and the micro contact breaker

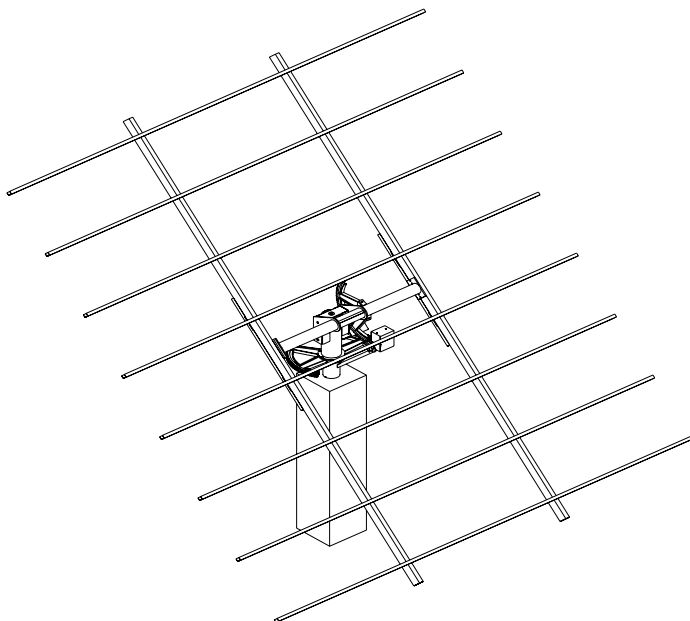
It is designed for withstanding winds of 140 km/h with 20 m² of panel surface.

Functioning:

Once the date, time and location coordinates are entered into the screen, with the buttons, the sun tracker is set.

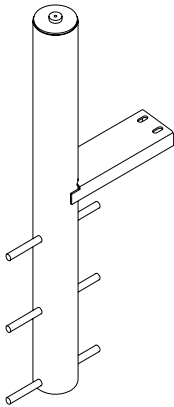
From this moment on, the tracker is working. Each X amount of minutes (between 1 and 90, according to what has been programmed), it calculates the position and moves the tracker if necessary.

At the moment that the sun sets, in other words, when the inclination of the sun over the horizon is negative, the tracker returns to the east and sets near the horizon again (some 80 degrees regarding the vertical).



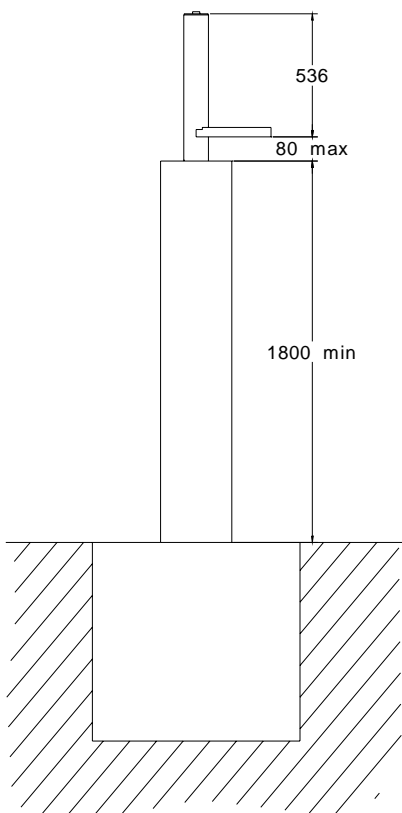
At the time that the sun comes up, the tracker goes back to an almost vertical position. From this moment on it carries out its normal daily movement.

GRAPHIC INSTALLATION FOR SOLAR TRACKER, SF20



1-Three corrugated steel bars are well inserted into the anchor in a concrete column.

Depending on where it's installed, it may be more practical to weld the post to a structure.



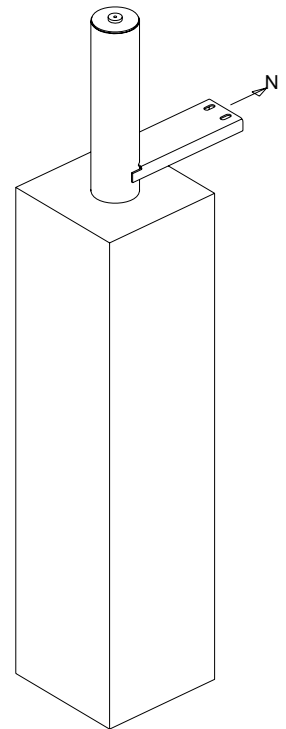
2-Insert it in the concrete column assuring that the "U" support of the motor points approximately to the north (maximum error: 10°).

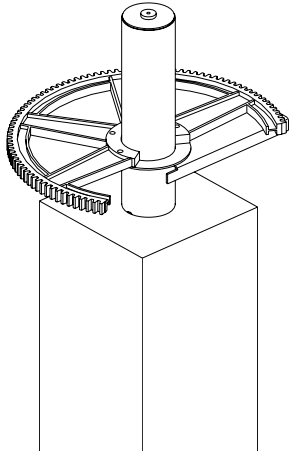
Before, make sure that the height is correct and that there isn't any obstacle with which the tracker could collide with while in movement.

In order to insure the resistance of the post, the furthest distance from the "U" up to the concrete column should be 80 mm.

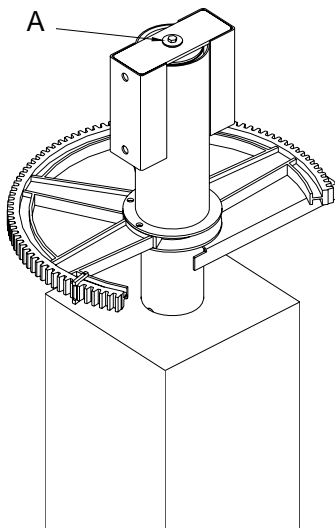
The shortest distance between the "U" and the floor should be 1.800 mm.

In order to know the dimensions of the column and the foundation, you're provided with a calculation program.

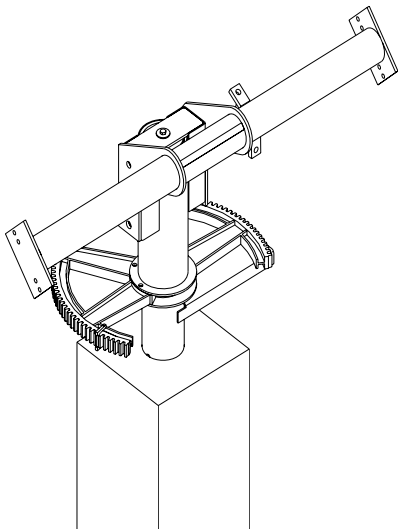




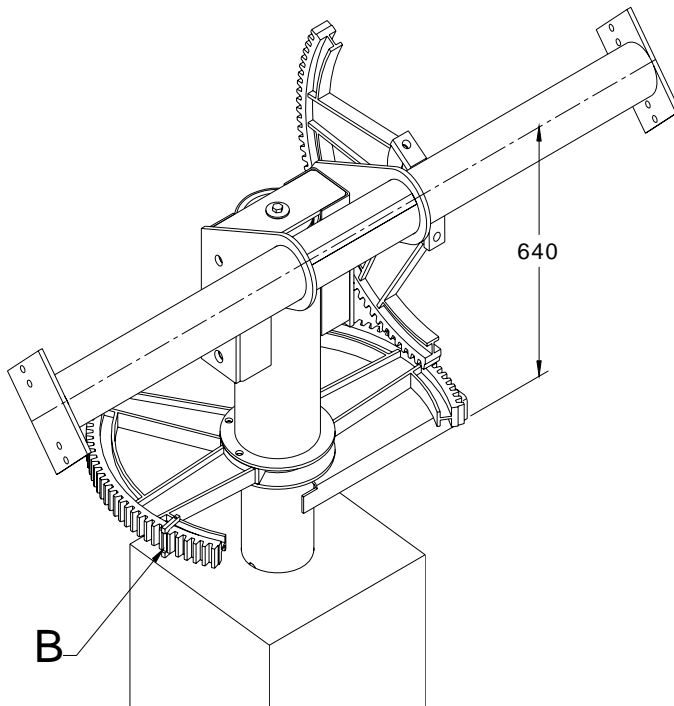
3-The iron hoop is inserted and on top of it the aluminium trim.



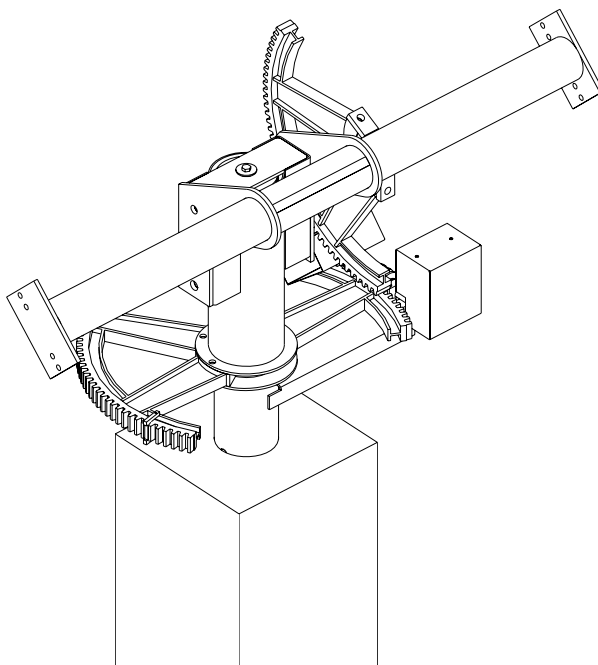
4-Insert the moving part, screw on with 4 screws and their bolts, the trim in the middle of the two iron hoops. The washer is placed on (A), so that the assemblage doesn't come loose, and secured with a screw.



5- Screw on the tube which acts as the main axis in the position shown by the illustration.

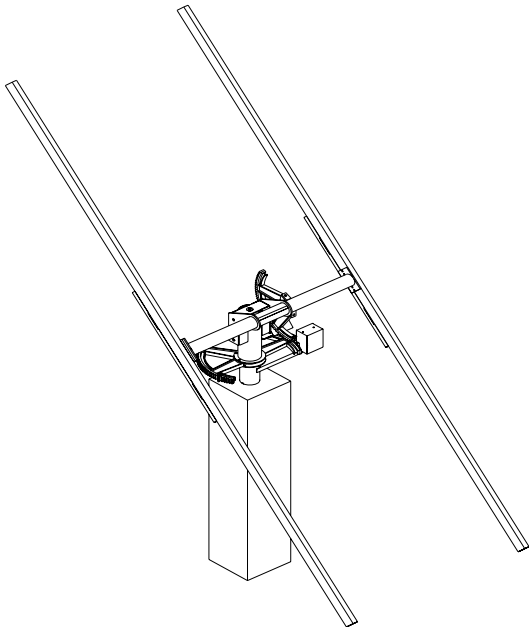


6- Place the part of the indented hoop with two M16 screws and washer plugs. The farthest points (B), will be installed at the appropriate places in order for the tracker to move freely without constrictions. Two in the hourly gear assembly and two extra in the inclination. Make sure that when it's all assembled, that these farthest points prevent the panels from being able to hit an obstacle..

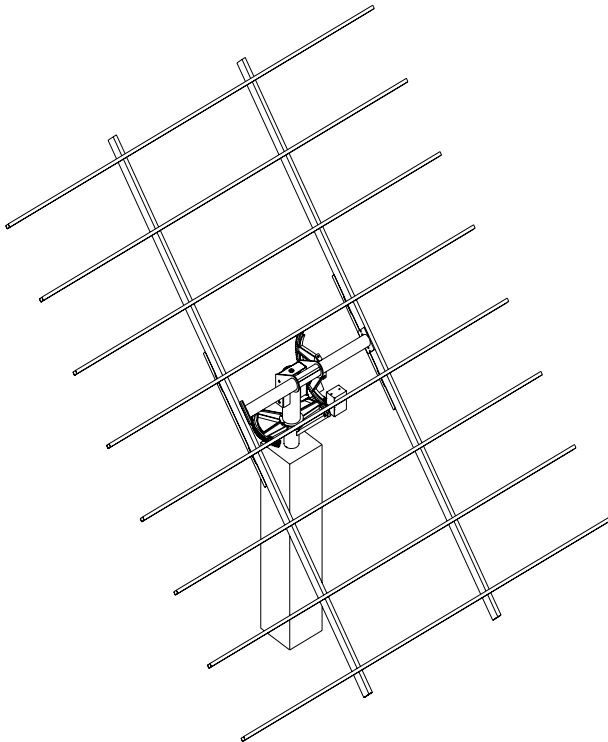


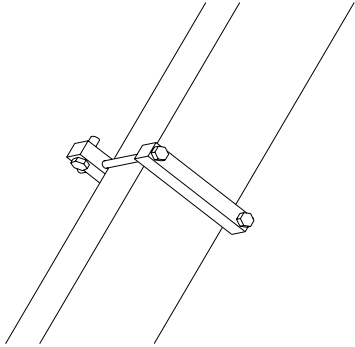
7- Install the motors, with their protective case. The electrical box can be screwed to the protective casing of the hourly movement motor (eastwest).

8- Screw on the two main bars.

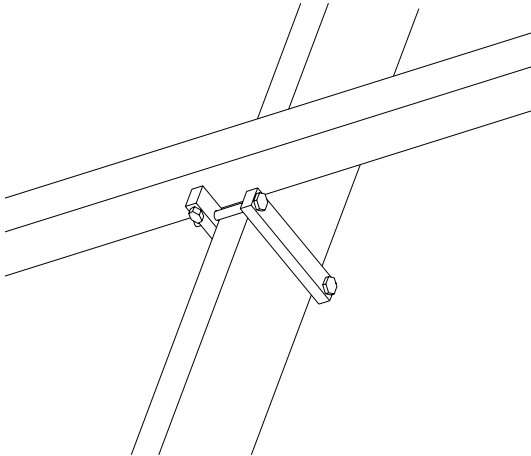


9- Place the bars in a “U” shape, as explained in detail further ahead. If the tracker is placed in a horizontal position feeding the motor with 12 V, can ease the task.

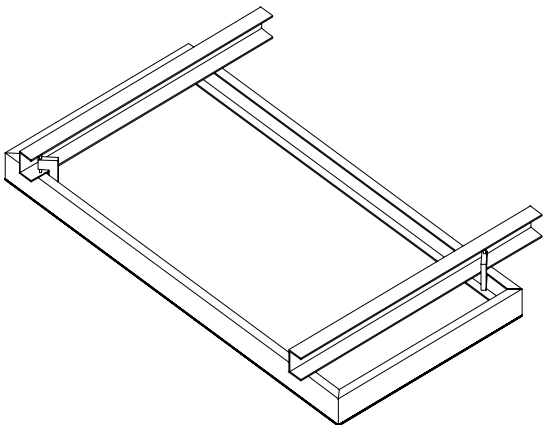




10- We will mount the support bridles of the horizontal bars as shown in the illustration.



11- Next we'll fasten the bars at a distance that we consider to be the best for the panels that we want to mount.



12- Next plug in all the switches and connect the wires to the grid. (see details ahead). Turn on the device to test it.

13- Set up the panels with the given bridles as it appears in the illustration.

ELECTRONICS AND PROGRAMMING

A wire from 1 to 4 mm² of section is connected (see further below), in the wire shaft found inside the hermetic box with the electrical system. It's marked with + and -, where the positive and negative are connected. Be careful not to invert the poles. Make the wire pass through the inner opening so that it remains quite hermetic.

If the distance between the power supply (normally battery), to the tracker is shorter than 8 meters, the cable should be 1 mm² of section. If it's between 8 and 22 meters, install a 2,5 mm² cable. If it's from 22 to 40 meters, install a 4 mm² cable.

Two hoses lead out of the electronic box. One long and the other shorter. On the long one is located the motor connector of the axis of inclination and the connector for the inclination switch (inside the metallic protective case). The short hose is the same but for the hourly motor.

Near the wire shaft is a switch. It turns on the electrical grid. After 2 seconds the following screen appears:

14/05/03 10:21

In other words, day, month, year, hour and minute. The red button changes the day. Each time it's pressed the number increases one unit. When it reaches 31 it resets to 0.

When the day is correct, continue to the black button for the next value to be changed, the month. Proceed as before. Just the same as with the year, hour and minute. Be careful! You should set the solar time, not the official time which is normally ahead an hour in winter and two hours in summer.

Now this screen will appear:

14/05/03 10:21
LON: -001°52'25^^
LAT : +41°42'50``

With the same procedure proceed to set the latitude and longitude of the location, keeping in mind the + or - signs on the longitude and latitude.

At any moment, if the information were correct, you could move directly onto the following screen with the blue button.

Then appears the following:

1 01
Incline axis
Black: vertical
Red: horizon.

The two ones or zeros that appear in the top right extreme of the screen informs us about the state of the two counter switches. The first number indicates if the counter switch of the axis of inclination is activated. (1: connected, 0: disconnected). The second number indicates the state of the hourly counter.

These two numbers can be very useful to know if any switch doesn't work.

With the two buttons we'll position the axis of inclination until achieving the correct inclination with regard to the inclination of the Sun in this moment (If it's evening or cloudy it will be best to wait for the Sun to come out).

Press the blue button again and then appears:

2 01
Hourly axis
Black: east
Red: west

With the two buttons we'll position the hourly axis until the base faces the Sun.

With the blue button we'll continue to the next screen with normal function. The one that's always activated:

14/05/03 16:21
HOR: +270° 0120
VER: +022° 0001
00 00 120 243 01

On this screen the date, hour and minutes are displayed. By pressing the black button we'll increment the minutes and the red button will decrease them.

The following line is the hourly position. 90° is when the tracker faces east, 180° is when it faces south and 270° when it faces west.

Next, on the same line is the number of impulses given by this axis from the start of the day.

The third line, is the same but with the axis in vertical movement. It would be 0° if the tracker were completely vertical and 90° completely horizontal.

The numbers on the fourth line are control numbers. At any rate, the last number indicates the minutes left to calculate the position of the tracker and begin to function, if this were the case, the motors.

By pressing the blue button we'll return to the two previous screens in order to adjust the tracker to face the Sun..



MALFUNCTION WARNINGS

When an motor doesn't work, or the tracker gets stuck or the switches fail, etc. the electronics detects it and an error message appears on the screen while the motors disconnects. There are two possible errors:

ERROR 26: The axis of inclination. This error appears on the screen when the electronics has ordered the inclination motor to start and during several seconds it has not detected any change of state in the counter switch of the engine. It's always opened or closed. From which it is deduced that one of the following things could occur:

- A) The inclination motor doesn't function
- B) The connections to the inclination motor fail
- C) The switch doesn't work or doesn't get activated
- D) The switch connections fail.
- E) The tracker is obstructed and therefore cannot move

ERROR 27: The same as in the previous error but with the hourly axis.

In two errors, the number of seconds that remains without receiving a signal change before disconnecting motors and going out, the error notice comes with a 6 second delay. In any event it's possible to change between 1 and 25 seconds. (See ahead, the V variable).



CONFIGURATION OF SOME PARAMETERS

By default this tracker already comes programmed so that it works perfectly, but it has a great flexibility to adapt itself to an infinite number of circumstances.

By changing the value of some variables we'll be able to extend or to correct functions.

If we want to change variables we'll have to do the following:

Press the connection switch and before 2 seconds of connection goes by, press the red button. A screen will appear before us where there are 8 values, from A to H. With the red button we can change every value and with the black button we can proceed to the following value. When we come to the value H, by pressing the black button we'll continue to the following screen where the values from I to P will appear, and by the same method a third screen with values from Q to X.

Some variables are not applicable, other are. Here is an enumerated list of the different variables and their uses:

A: Not applicable

B: Not applicable

C: Minimal inclination of the tracker with regard to the vertical one. By default it's at 22°. The status goes from 0 to 85°. The tracker allows itself to set at almost 0° but it's not advisable because depending on the position with the axis of inclination it might run into any obstacle.

Modifying this variable can serve us for several things. For example, if we have an obstacle that makes interference when the device is very vertical. If for whatever reasons that maybe, we only want the hourly axis to move, we can put this variable to 85°. Such as in European latitudes the Sun never reaches this inclination, the axis of inclination will never move.

D: Not applicable

E: Range of movement from east to west. By default, 180°. Otherwise, from the midday position, (south), the range of movement will be +/-90°. It can be programmed from 0 to 255°.

In the case of 255° it would mean that it would go from -127,5° (Northeast) to +127,5° (Northwest) in reference to the south. Anyhow, the tracker doesn't permit such a wide range of movement.

F: Number of impulses from the switch of the hourly motor to complete its hourly course. By default 400. The number of impulses that the tracker generates to complete 180° that exists for default, is 400. if we only want it to do 150°, besides modifying the variable E, we'll have to modify F, since doing 150° will only create 333 impulses.

G: Time, in minutes, between movements of the tracker. By default, 30 minutes. It can be programmed between 1 and 98 minutes. If it's 30 minutes, it means that every 30 minutes it will calculate the position of the Sun and if they correspond, the tracker will move. On the normal functioning screen the number that on the fourth line to the right indicates the number of minutes remaining until the next calculation.

H: Language. From 1 to 4.

I: Night position activation. If it's at 0 the tracker will do its normal day movement and in the evening, when the Sun set, it will turn to the back towards the East, keeping the tracker in next closest vertical position (by default 22°). If it's at 1, in the evening the tracker shifts to horizontal. This can be useful to make the access to the panels difficult avoiding robbery. It can also be useful to minimise the time of vertical position in which it's in when the wind is the strongest. Although normally the maximum winds aren't at night but during the afternoon.

J: Not applicable

K: Not applicable

L: Clock speed. By default this variable is at 10, the values go from 0 to 98. If the clock runs fast, increase the value of the variable. For every unit that we increase, the clock will slow down 0,25 daily seconds. Just the opposite if we decrease the value.

M: Not applicable

N: Not applicable

O: Not applicable

P: Not applicable

Q: Not applicable

R: Not applicable

S: Not applicable

T: Not applicable

U: Not applicable

V: Time, in seconds, in which the electronics should be without receiving a signal to show the error. By default 6 seconds. It can be adjusted between 1 and 25 seconds.

X: Time, in minutes, by which the tracker will set itself horizontally if given the order because of the wind. By default 60 minutes. Values adjust from 10 to 190 minutes. In the electrical grid there is a wire shaft of two contacts, one indicated with "V", that if the circuit closes between these two contacts, the tracker will set itself for us horizontally during the programmed time. If we have an anemometer that at a certain wind speed closes a circuit, it will allow us to use this system for major protection from winds.

